NON-PUBLIC?: N
ACCESSION #: 9007030031
LICENSEE EVENT REPORT (LER)

FACILITY NAME: VERMONT YANKEE NUCLEAR POWER STATION PAGE: 1 OF 05

DOCKET NUMBER: 05000271

TITLE: Inadvertent Reactor Scram Due to a Short Circuit on the Vital AC Bus as a result of Personnel Error.
EVENT DATE: 06/01/90 LER #: 90-009-00 REPORT DATE: 06/29/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: DONALD A. REID, PLANT MANAGER TELEPHONE: (802) 257-7711

COMPONENT FAILURE DESCRIPTION:
CAUSE: A SYSTEM: EF COMPONENT: MG MANUFACTURER: G080
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 06/01/90, at 1353 hours, with the Reactor at 100% power, a contract electrician working on a normal/emergency lighting panel allowed a ground wire to come in contact with a live bus. The resulting short circuit caused the Vital AC Motor Generator Set (EIIS=EF) to lose the field excitation and subsequently a loss of generator output. On the loss of generator output, the Vital AC bus transferred to its alternate source. This caused a pressure transient in the reactor coolant system due to the transfer from the Electric Pressure Regulator to the Mechanical Pressure Regulator, resulting in a Reactor Scram. On 06/03/90, at 0103 hours, the Reactor Mode Switch was returned to the RUN position and the Main Generator phased to the grid.

The root cause of this event was personnel error due to a lack of mental attention.

Corrective actions will include electrical contractor retraining and increased emphasis on safety and attention to detail. An evaluation will be performed of the Vital AC MG set to determine if collapse of the generator field as a result of the fault was the appropriate equipment response. A Plant Operational Review Sub-Committee will evaluate the need for a formal guideline governing work in energized electrical equipment.

No other incidents involving a fault on the Vital AC causing a Reactor Scram have occurred in the last five years.

END OF ABSTRACT

DESCRIPTION OF EVENT

On 06/01/90, at 1353 hours, with the Reactor at 100% power, an electrician working on the normal/emergency section of Control Room Lighting Panel LP-1L lost control of a ground wire and allowed the wire to come in contact with an exposed portion of the live bus. The wire struck the live bus twice and the resulting short circuit caused the Vital AC Generator to lose its field excitation with a subsequent loss of generator output. On the loss of generator output, the Vital AC bus transferred to its alternate power source which originates from Motor Control Center (MCC) 9A. This transfer causes a short interruption of power to the Vital AC loads as the break from the generator must be complete before the closure onto the alternate source is initiated. As a result of this short interruption to the Vital AC bus, some of the systems powered by this bus locked-up or froze in the positions they were in before the power interruption. During the short interruption of the Vital AC power, the Reactor Recirculation Motor Generator scoop tubes locked-up, and the Turbine Control System Electrical Pressure Regulator (EPR) was lost resulting in the transfer to the Mechanical Pressure Reguator (MPR).

At 1353 hours, Reactor pressure spiked to approximately 1024 psig due to the EPR to MPR transfer. This increase in pressure caused the steam voids in the vessel to collapse, which resulted in a Reactor Scram when the Average Power Range Monitors (APRM) detected a high flux signal. All rods inserted reducing Reactor power to less than 2%.

Following the Reactor Scram, at 1354 hours, the reactor steam generation rate, and consequently the main steam line pressure, began to reduce. Due to the response time of the MPR and turbine control valves,

the main steam line pressure reduced below the PCIS Group I limit which is in effect with the mode switch in "RUN", this resulted in a PCIS Group I isolation. The increase in Reactor pressure from the Group I isolation caused Reactor water level to decrease resulting in Group 2, 3 and 5 PCIS isolations.

At 1355 hours, "C" Reactor Feedwater Pump was secured to control water level.

At 1358 hours, the Reactor Core Isolation Cooling (RCIC) system was started to control pressure. Outboard Main Steam Isolation Valves (MSIV) were manually opened to allow line-up to Main Condenser.

At 1359 hours, the "A" Safety Relief valve was manually opened to reduce Reactor pressure. Reactor water level increased due to the reduction in pressure and caused RCIC and the "B" Reactor feedwater pump to trip. The "A" and "C" Reactor feedwater pumps started automatically due to the trip of the "B" pump and the lack of a sustained high reactor water level signal. The "A" Safety Relief Valve was manually closed at 990 psig. The Inboard MSIV's were opened to enable use of the Main Condenser for pressure control.

At 1404 hours, the "A" and "C" Reactor feedwater pumps tripped due to high water level as a result of the Inboard MSIV's being opened, reducing pressure in the Reactor.

At 1405 hours, the Recirculation Motor Generator scoop tube lock-up was reset and Recirculation pump speeds reduced to minimum.

At 1408 hours, the 10% Reactor feedwater control valve was placed in service for water level control.

At 1425, Reactor level was 173 inches with pressure at 960 psig.

At 1426 hours, the Reactor Water Clean-up system was started in letdown mode for water level control.

At 1428 hours, the Scram Recovery Effort was initiated with subsequent crew debriefing and a four-hour notification made to the U.S.N.R.C.

On 06/02/90, at 1311 hours, the Vital AC bus was returned to the motor generator set from the alternate source and Reactor start-up commenced at 1715 hours, the Reactor was critical at 1905 hours.

On 06/03/90, at 0103 hours, the Reactor Mode Switch was switched to the "RUN" position and the Main Generator phased to the grid.

CAUSE OF THE EVENT

The initial cause of this event is the ground wire striking the exposed bus portion of the normal/emergency section of lighting panel LP-1L which is fed from Vital AC. As a result of this short circuit, a ground was placed on the Vital AC bus and subsequently the Vital AC generator output. Because this fault was intermittent, the generators' output circuit breaker and the Vital AC distribution panel VAC feeder breaker supplying the normal/emergency section of lighting panel LP-1L did not sense the fault and therefore did not trip.

This condition allowed the generator to feel the affects of the fault, resulting in the loss of field excitation and a subsequent loss of generator output voltage.

ROOT CAUSE

The root cause of this event is personnel error. The electrician was attempting to crimp a wire lug on the ground wire and was aware that the wire had a possibility of recoiling if not held firmly. He had been cautioned concerning the sensitivity of performing work in the Control Room. A Root Cause Analysis has determined that the event was caused by personnel error due to a lack of mental attention.

ANALYSIS OF EVENT

The event did not have any adverse safety implications to the plant's equipment or the general public in that all plant safety functions performed as designed or expected.

The lock-up of the Recirculation MG set scoop tube, the Feedwater Regulator and transfer from EPR to MPR are expected conditions as a result of a loss of the Vital AC bus. A Reactor scram may occur with an EPR to MPR transfer during a transient condition.

An analysis of the sequence of events shows that the Recirculation MG set scoop tubes did lock-up in their last known position and the Electric Pressure Regulator did transfer to the Mechanical Pressure Regulator. The Feedwater Regulator did not lock-up because the transfer was so fast that its control solenoids did not have enough time to

bleed-off sufficient air to cause a lock-up, the power was restored in approximately one second. The transfer from the EPR to the MPR during a transient condition allowed Reactor pressure to increase which caused void collapse and corresponding neutron flux increase which resulted in the APRM scram signal.

CORRECTIVE ACTIONS

Immediate:

Scram Recovery initiated, the Operations crew on duty were debriefed, the event was reconstructed from the computer data points and a four-hour notification was made to the U.S.N.R.C.

Subsequent:

1. The following Administrative actions have been implemented by the on-site electrical contractor: All electrical Foremen will notify their immediate Craft Supervision before opening any lighting or power panels. After removing the panel cover, the Craft Supervisor and Foremen shall inspect the panel to determine what steps need to be taken to protect any exposed or energized portions of the panel. At this time, the Craft Supervisor will determine and discuss with the Foremen and Craft personnel the sensitivity of the panel being worked on. When it is known that work is to be done on or in sensitive electrical panels or equipment, this fact shall be emphasized at the pre-job training.

2. Vermont Yankee has instructed the on-site electrical contractor to emphasize safety and attention to detail when working on or near energized panels or equipment. In addition, the electrical contract supervision are to monitor their Craft personnel to assure that they adhere to the proper safety practices.

3. A Plant Operations Review Sub-Committee has been established to review the needs for formal guidelines governing work activities within energized electrical equipment. Guidelines will be established if they are determined to be necessary.

4. An evaluation will be performed for the Vital AC MG set to determine if collapse of the generator field as a result of the fault was the appropriate equipment response.

ADDITIONAL INFORMATION

No other incidents involving a fault on the Vital AC causing a Reactor Scram have occurred in the last five years.

ATTACHMENT 1 TO 9007030031 PAGE 1 OF 1

VERMONT YANKEE NUCLEAR POWER CORPORATION

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VERNON, VERMONT 05354

June 29, 1990
VYV# 90-220

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

REFERENCE: Operating License DPR-28
Docket No. 50-271
Reportable Occurrence No. LER 90-09

Dear Sirs:

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 90-09.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Donald A. Reid
Plant Manager

cc: Regional Administrator
USNRC
Region I
475 Allendale Road
King of Prussia, PA 19406

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